

**CONCORDIA UNIVERSITY
DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY**

**CHEM 427/627 (section 02)
SELECTED TOPICS IN ORGANIC CHEMISTRY**

Polymer Chemistry and Nanotechnology

SYLLABUS – Fall 2023

1. General Information

This course will deal with advanced knowledge in polymer chemistry, materials science, and biomedical engineering. *CHEM222 is a prerequisite for undergraduate students.*

Instructor	Dr. John (Jung Kwon) Oh Department of Chemistry and Biochemistry Faculty of Arts & Science Office: SP 275.09 Email: john.oh@concordia.ca
Course Format	Lectures only
Lectures	Tuesday & Thursday, 11:45-13:00
Location	Loyola campus, CC-405
Office hours	Thursday, 2:00-3:30 PM (or by appointment)
Course web page	Course Moodle (www.myconcordia.ca)
Recommended Textbook	<i>Introduction to Polymers</i> , 3 rd Ed., R.J. Young and P.A. Lovell; CRC Press <i>Block copolymers: synthetic strategies, physical properties, and applications</i> , N. Hadjichristidis, S. Pispas, and G.A. Floudas

2. Course Description

The course will offer the introductory polymer chemistry with an emphasis on polymer synthesis. Various methods to synthesize polymers will be discussed; they include classical step growth, free radical, ring opening polymerization, and other polymerizations; and modern living anionic, cationic, and living controlled/radical polymerization. Further, this course will discuss the design and development of functional polymers as building blocks to develop nanomaterials for bio-related applications, particularly drug delivery applications. Topics include amphiphilic block copolymers, self-assembly, micellar nanocarriers, cellular imaging, multifunctional drug delivery, and crosslinked nanogels/hydrogels. Lectures only

Polymer synthesis:

Polymer basic
Step-growth polymerization
Chain-growth polymerization/free radical polymerization
Anionic & cationic polymerization
Living/controlled radical polymerization- ATRP, RAFT, NMP
Other important polymerization methods: ROP, ROMP, etc
Block copolymerization

Polymers for bio-related applications:

Block copolymer general and self-assembly

Polymer-based drug delivery general

Stimuli-responsive degradation platforms/controlled release

Crosslinked nanomaterials-drug delivery & tissue engineering

3. Schedule (*may be subject to change*)

- **Term Test**/70 min during the class (**November 14**)
- **Final exam**/150 min

- **Presentations during the classes (9-12 weeks)**
- **Term report due/5 pm on five days after last class**

- Your absence for term test will be excused, with medical note (signed by a doctor on the appropriate letterhead paper) & short-term absence. The weight of the term test will be integrated to the final exam.
- Note that there are **no make-up exams for both term test and final exam.**

4. Grading

Undergraduate (CHEM 427)

Class Participation	10%
Term Test:	15%
Final Exam:	30%
	55%
Participation for presentation:	10%
Presentation	20%
Term Report	15%

Graduate (CHEM 627)

Class Participation	10%
Term Test:	10%
Final Exam:	20%
	40%
Participation for presentation:	10%
Presentation:	20%
Term Report:	30%

Presentation (for both undergraduate and graduate students) would be 10-15 min long including questions/answers. Topics and presentation should focus on the synthesis and applications of polymers and their materials including hybrid materials (containing inorganic or organic nanoparticles), based on >3 (UGs) and >5 (Gs) core research articles (journals).

- Evaluation criteria: presentation skills, science, and questions/answers.
- Research articles published in recent 5 years in reputational journals (ACS, Wiley, RSC, Elsevier, Nature, Science, etc). **No internet sources are accepted.**

Term report for undergraduate students:

- 2 page long **excluding** references
- Criteria: synopsis (or abstract), summary/contents, conclusion/perspectives
- Format - single space, 12 font/Times or 11 font/Arial, 1 inch margin of four sides
- No more than 1 figure

Term report (graduate students only):

- 4 page long **excluding** references
- Criteria: synopsis (or abstract), introduction, discussion, conclusion and perspectives
- Format - single space, 12 font/Times or 11 font/Arial, 1 inch margin of four sides
- No more than 2 figures

Penalty for late submission of term reports: 20%; two day late submission: 50%; after two day: 75%.

Grading scale:

0 F; 50.0 D-; 53 D; 57 D+; 60 C-; 63 C; 67 C+; 70 B-; 73 B; 77 B+; 80 A-; 85 A; 90 A+

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

“CHEM 101”: The Academic Code of Conduct: Ethical Use of Information Sources

MANDATORY QUIZ AND SEMINAR

As part of your CHEM course, you are **required** to i) attend a Chemistry and Biochemistry Departmental Seminar on the academic conduct code and the appropriate use of information sources and ii) pass the online quiz associated with this seminar (the passing grade for the quiz is 100%). (**Note:** this quiz is graded by the Department of Chemistry and Biochemistry, and you do not have access to it until after you have attended the seminar. Therefore, any other quiz you may have taken on the academic code of conduct does not count toward the CHEM 101 requirement.) The aim of this seminar and quiz is to clarify the academic conduct code in terms of which practices will be considered unacceptable with regards to work submitted for grading in your CHEM course. **You are only exempt from repeating the seminar and the quiz if you have done both in Fall 2018 or more recently,*** otherwise you are required to repeat both this term. This short seminar (1 hour) will be held at the following times (note that you will not be given credit if you join too late and/or leave too early):

Date (Fall 2023)	Time	Mode	Registration link
Sept. 20 (Wednesday)	21:00- 22:00	Zoom	https://concordia-ca.zoom.us/join/981234567890
Sept. 21 (Thursday)	21:00- 22:00	Zoom	https://concordia-ca.zoom.us/join/098765432109
Sept. 25 (Monday)	21:00- 22:00	Zoom	https://concordia-ca.zoom.us/join/109876543210

As space for each of the Zoom seminars is limited, please **register early** for your preferred slot (copy the corresponding link above into your browser). **Look out** for the Zoom email with the link to the actual seminar. Then do not forget to **attend** that seminar slot on the date above. You will **not** receive a reminder on or before the date!

Prof. John Oh/Chemistry

We will take attendance at the Zoom seminar.

If you do not complete this course requirement, your final grade for the course may be lowered by one full letter grade with an incomplete (INC) notation until such time as this requirement is completed. Please refer to the undergraduate calendar (section 16.3.5) for details on removal of an incomplete notation.

* You are exempt if you can locate your ID in the pdf file located on the Departmental web site (<http://www.concordia.ca/content/dam/artsci/chemistry/docs/Compliance-list.pdf>) and if there is no entry in the "quiz" column for you.

PLAGIARISM AND OTHER FORMS OF ACADEMIC DISHONESTY

The Academic Code of Conduct can be found in section 17.10 of the academic calendar (<http://www.concordia.ca/academics/undergraduate/calendar/current/17-10.html>). Any form of unauthorized collaboration, cheating, copying or plagiarism found in this course will be reported and the appropriate sanctions applied. The mandatory seminar is a clear and fair opportunity to learn what our faculty regards as academic misconduct. Failure to take part in this learning opportunity and thus ignorance of these regulations is no excuse and will not result in a reduced sanction in any case where academic misconduct is observed.